s18: EXP LOG (SLTN v338)
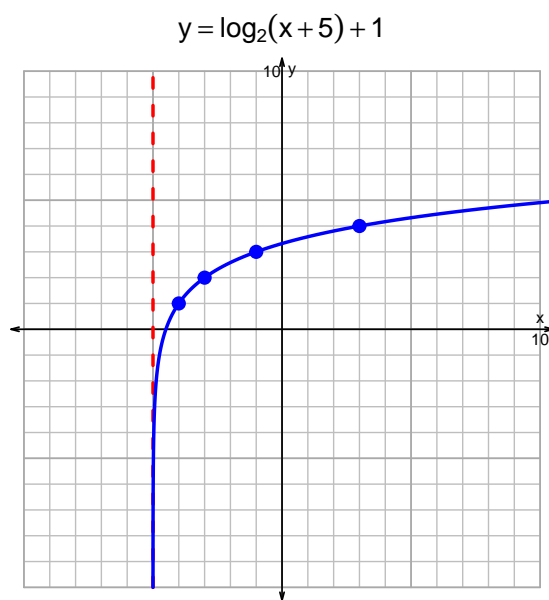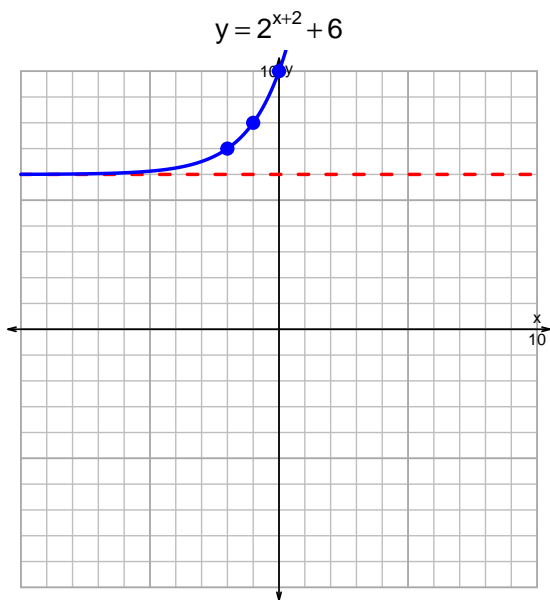
1. (10 pts) Graph $y = 2^{x+2} + 6$ and $y = \log_2(x+5) + 1$ on the grids below. Also, draw any asymptotes with dashed lines.

$$y = 2^{x+2} + 6$$

$$y = \log_2(x+5) + 1$$

Somewhat useful hint: $2^3 = 8$, and thus $\log_2(8) = 3$.

2. (10 pts) Write (but do not evaluate) the solution to the equation below by writing a logarithmic expression. Please do not do any arithmetic; just move numbers around.

$$11 = \left(\frac{4}{7}\right) \cdot 10^{5t/3}$$

Divide both sides by $\frac{4}{7}$.

$$\frac{11 \cdot 7}{4} = 10^{5t/3}$$

Take log, base 10, of both sides.

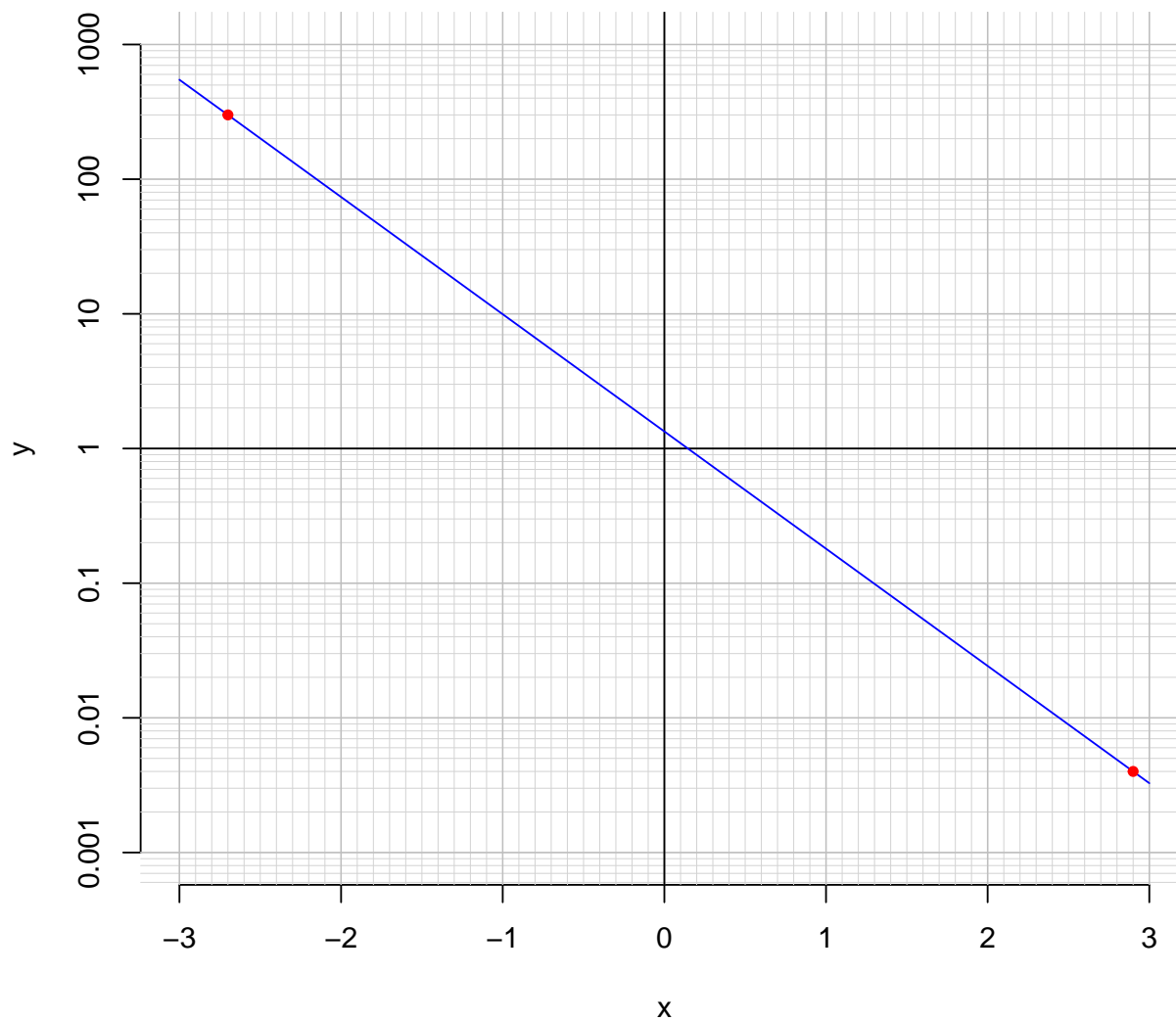$$\log_{10}\left(\frac{11 \cdot 7}{4}\right) = \frac{5t}{3}$$

Divide both sides by $\frac{5}{3}$.

$$\frac{3}{5} \cdot \log_{10}\left(\frac{11 \cdot 7}{4}\right) = t$$

Switch sides.

$$t = \frac{3}{5} \cdot \log_{10}\left(\frac{11 \cdot 7}{4}\right)$$

3. (10 pts) An exponential function $f(x) = 1.34 \cdot e^{-2x}$ is graphed below on a semi-log plot.

a. Using the plot above, evaluate $f(-2.7)$.

$$f(-2.7) = 300$$

b. The inverse function is logarithmic.

$$f^{-1}(x) = \frac{-1}{2} \cdot \ln\left(\frac{x}{1.34}\right)$$

Using the plot above, evaluate $f^{-1}(0.004)$.

$$f^{-1}(0.004) = 2.9$$